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ABSTRACT

The first phase of a four-phase study on the effectiveness of microfiche medium for onboard training systems examined a variety of microfiche readers with respect to: (1) ease-of-use; (2) loading and unloading characteristics; and (3) branching to specific microfiche frames. Some 60 Navy recruits performed branching tasks to simulate the branching requirements of programed instruction. Based on equipment evaluations and recruit performances, five indexing methods and four types of readers were rank-ordered. Recruits did not experience difficulty with any of the readers, however, the Realist/Vantage I reader with a grid map index for branching was most highly rated. (EMH)

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TAEG Report No. 35

AN EVALUATION OF MICROFICHE READER TYPES FOR USE WITH PROGRAMMED INSTRUCTION

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Training Analysis and Evaluation Group

August 1976

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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SECTION I

INTRODUCTION

The technological complexity of Navy weapons systems has caused a burgeoning volume of supporting documents in the form of maintenance manuals, software files, and training materials. Paper documentation has reached a critical mass with respect to storage space and the effort required to maintain current materials, particularly aboard ships.

Micrographics are being used to overcome data storage and retrieval problems and to reduce the expense of producing and updating these materials. As an example, the Defense Logistics Services Center publishes the Federal Catalog System publications on microfiche--a vast undertaking that provides a flow of catalogs to the supply departments of every command within the Department of Defense (DoD). In another effort, the Navy Shipboard Microfiim Program will distribute 1300 SECNAV and OPNAV directives on microfiche during the fall of 1976 and will distribute various communications publications on microfiche at about the same time. Within the Shipboard Microfilm Program, 90,000 technical manuals will be screened for micropublishing. Those that are considered to be usable and cost-effective in the microfiche format will be converted during this five-year program.

Recent studies have indicated that microfiche may be a viable medium for training (Baldwin and Bailey, 1971; Grausnick and Kottenstette, 1971a, 1971b; Braby, et al., 1975). The decision to use microfiche vice paper is generally based on increased economy or ease of handling. Microfiche are simple and inexpensive to reproduce, distribute, store, and update. However, individuals required to read the microfiche are often less than enthusiastic about the medium. To some it appears that the users' interests are being compromised for overall system economy. Little research effort has been directed at the user end of the micro-publishing process.

Microfiche-based instructional systems are being considered for onboard training. To assess the feasibility of this concept, the Chief of Naval Education and Training (CNET) has tasked the Training Analysis and Evaluation Group (TAEG) to compare the use of microfiche with paper and electronic media. Emphasis is to be placed on the efficiency of the microfiche medium vice alternatives with respect to the human factors considerations impacting on the ease-of-use and the effects on learning.

Four related studies have been planned in a project designed to resolve major issues in the application of the microfiche medium in onboard training programs and to examine the human factors problems of the user engaged in extended use of microfiche in a training environment. Phase I evaluates a cross-section of microfiche readers with respect to

their ease-of-use by Navy enlisted personnel in loading/unloading and branching to nonadjacent frames. This report presents the results of the phase I study. Phase II will study the use of microfiche as the training medium in a complete, self-paced, technical training course. Phase III will replicate the data collected in the phase I and phase II studies using the Personalized Portable Micromedia Display System (PPMDS), a hand-held microfiche reader being developed by the David W. Taylor Naval Ship Research and Development Center. Finally, phase IV will evaluate learning modules designed for the microfiche medium using learning algorithms developed by TAEG (Aagard and Braby, 1976). It is anticipated that the four phases of the project will be completed by December 1977.

PURPOSE OF THIS STUDY

The purpose of this phase I study was to evaluate different frame locating mechanisms in a cross-section of commercially available microfiche readers and to determine the ability of Navy enlisted personnel to perform a branching task using these readers. A concomitant purpose was to rank the readers in the order of time required to load a microfiche, locate and focus a reference frame, and remove the microfiche. This type of performance data is needed in choosing readers for training systems. Performance data are also needed for designing microfiche programs. One form of programmed instruction involves considerable branching using remedial loops to support a student achieving criterion performance. Therefore, data are needed on the ability of students to proceed through a branching path of nonadjacent frames and on the effect of the distance between two nonadjacent frames on time and accuracy.

SECTION II

METHOD

DESIGN

Sixty subjects were randomly assigned to five experimental groups in a 4x5 factorial design to examine the effects of trial blocks and microfiche reader loading mechanisms on the ease of loading/unloading microfiche. Between loading/unloading task trials, the subjects performed simulated branching exercises. These data were arranged in a 4x4x5 factorial design to examine the effects of trial blocks, frame-to-frame interval, and frame locating mechanisms on ease of locating designated microfiche frames.

APPARATUS

Four commercially available microfiche readers were used, representing typical frame indexing and microfiche carrier designs. The Bruning Model 95 (automatic) (figure 1) employs a push-button actuated servomechanism which positions the desired microfiche frame when the corresponding alphanumeric buttons are depressed. Up to 30 microfiche may be preloaded in a magazine to allow selection of a particular microfiche by pushing a button. The Kodak Ektalite 120 (linear/dial) (figure 2) reader has a linear index, controlled by a push-pull motion of the film carrier, which indicates the row being displayed, and a rotating dial controlled by twisting a knob, which indicates the column displayed. The carrier rollers friction feed the microfiche into the reader as the dial index is turned. The WSI Mini-Cat 1114 (dual linear) (figure 3) reader has two linear indices associated with the carrier which correspond to the microfiche alphanumeric frame designators. The microfiche carrier consists of two glass flats positioned by an attached handle. The Realist/Vantage I (figure 4) reader was used in two configurations--with and without the grid map indexing system. The grid map index consists of a card adjacent to the carrier with the alphanumeric frame designators depicted as they appear on the microfiche frames. By moving a pointer attacned to the carrier to a specific frame on the grid map, the desired frame appears on the reader viewing screen. Without the grid map, frames may be positioned by observing the alphanumeric designators as they appear on the viewing screen while moving the carrier in a rectilinear fashion. This reader also employs a dual glass flats carrier.

Timing of events was recorded by a six channel Clevite/Brush graphic recorder. The recorder was controlled by two three-position, double-pole switches, operated by the experimenters.

Two IBM 274 Portable Dictating Units were used to present standardized,

Figure 1. Bruning 95

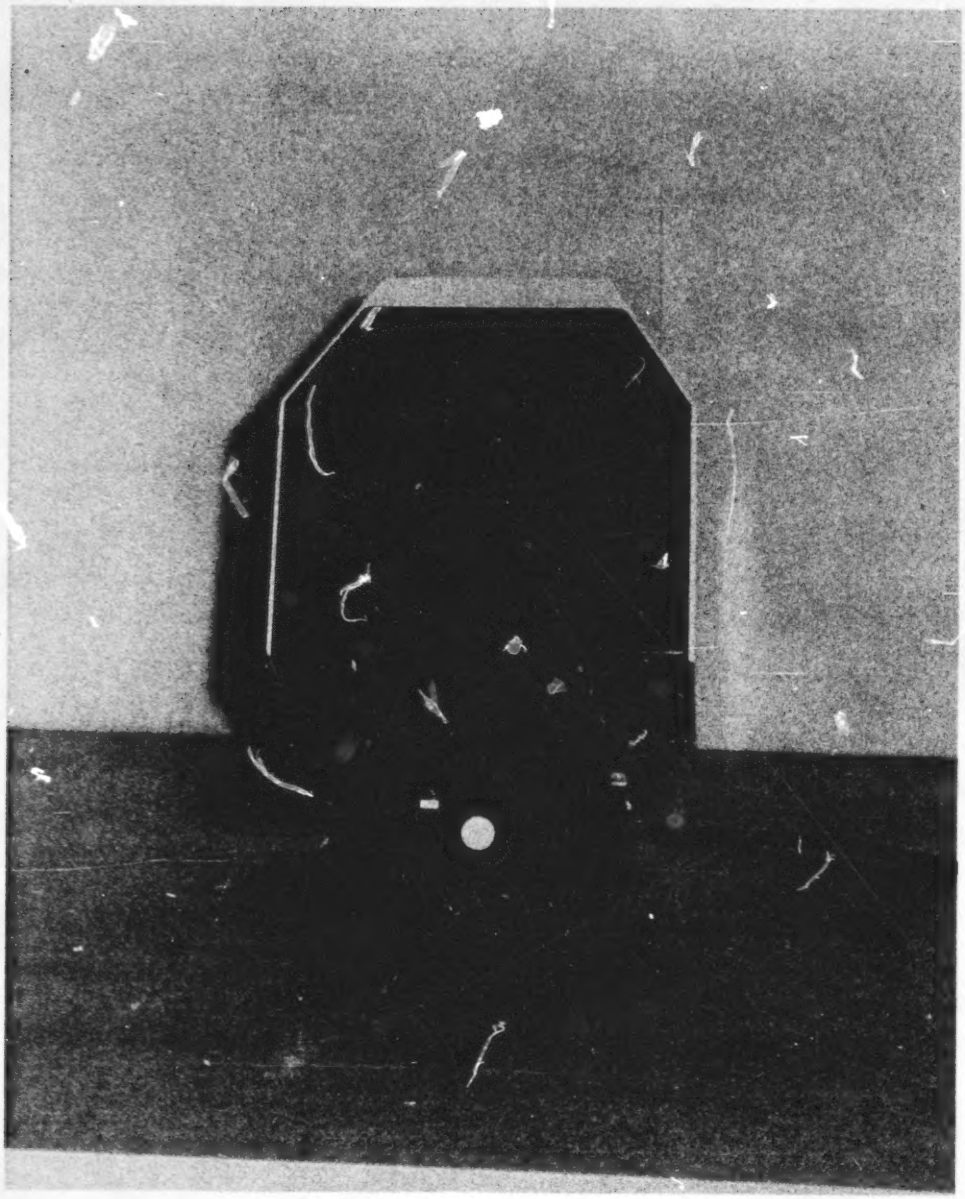

Figure 2. Kodak Ektalite 120

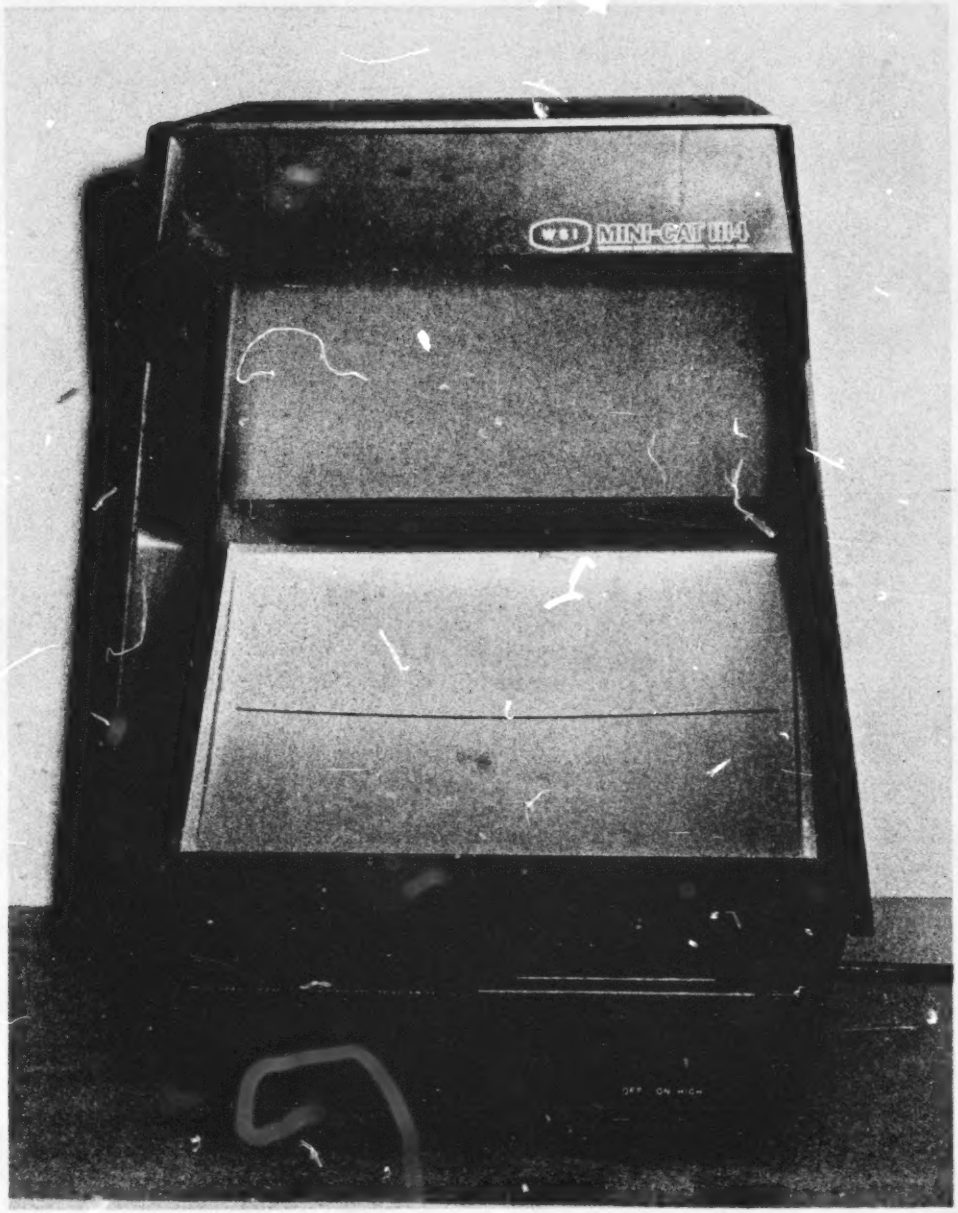

Figure 3. WSI Mini-Cat 1114

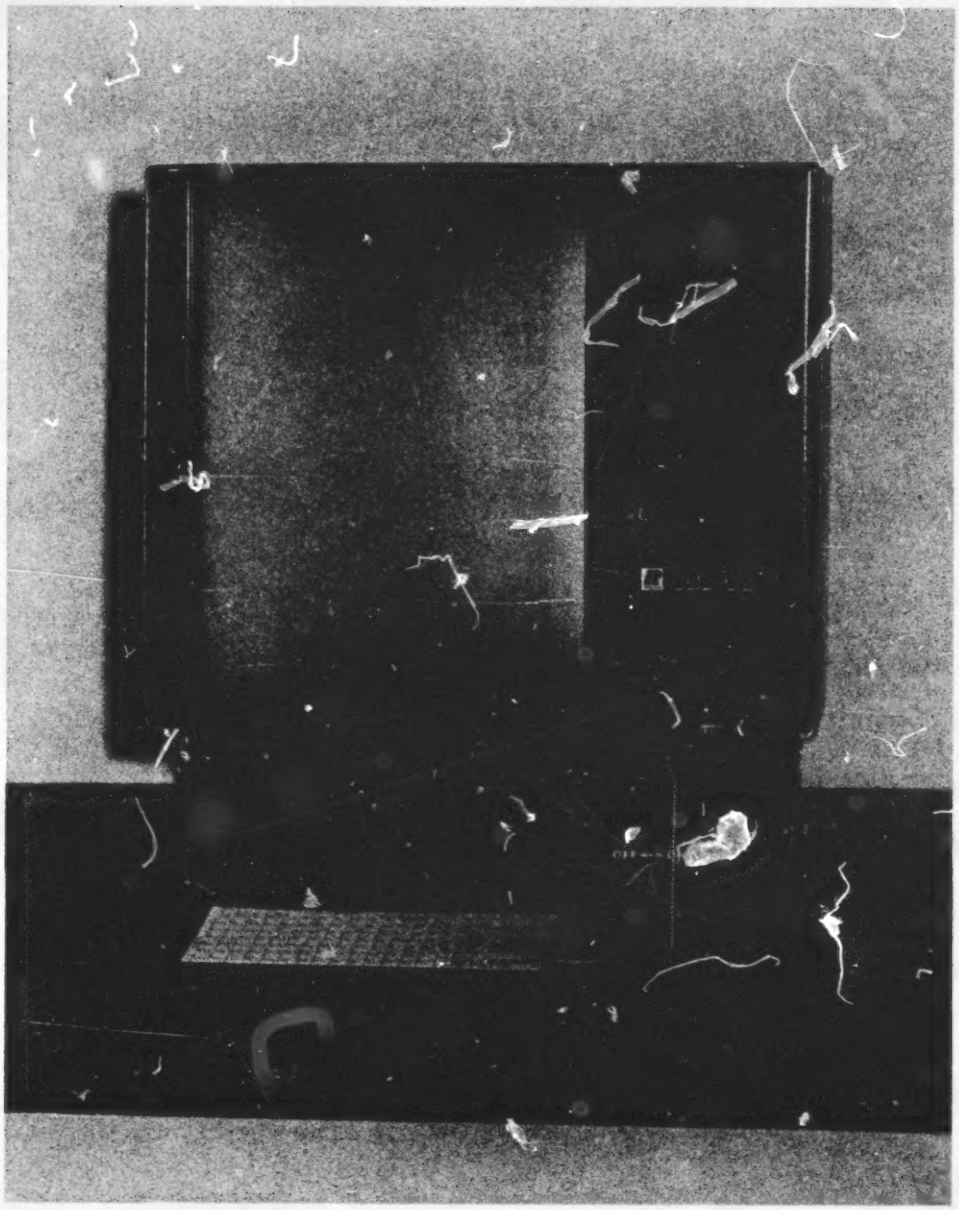

Figure 4. Realist/Vantage I

taped instructions to the subjects.

STIMULUS MATERIALS

The branching task consisted of a series of instructions on microfiche frames requiring the subject to move from one frame to another. There were 10 instructions on each microfiche, terminating with a frame marked "END." All frames on the microfiche had alphanumeric designators centered 2.5 cm from the top, and either an instruction (e.g., "GO TO B3") or the word "END" centered 2.5 cm above the center of the frame. The initial instruction frame (A-3) on each microfiche included the word "START." All non-instruction frames contained the word "END" so that a departure from the prescribed path would be immediately apparent to the experimenter. A sample microfiche is shown in figure 5.

A total of eighteen 24X microfiche were used for each subject--two for practice and sixteen for the timed exercise. The first practice microfiche had a frame-to-frame interval (i.e., the number of frames from one instruction to the next) of one, while the second had intervals varying from one to eight frames. The frame-to-frame intervals used were determined by a pilot study which revealed that frame-to-frame intervals of 1, 2, 4 and 8 frames resulted in significantly different times to complete the branching task. Four microfiche at each of these intervals were made by randomly selecting the branching paths. No two microfiche had the same branching path.

SUBJECTS

A representative sample of 60 male Navy recruits, midway through basic training, was selected. The subjects were randomly assigned to five experimental groups. Subjects had either very little or no experience using microfilm. None had prior experience using the reader to which they were assigned.

PROCEDURE

Two subjects were scheduled per hour, twelve subjects per day, on five consecutive days. Two subjects performed the exercise simultaneously at opposite corners of a large conference room. Two experimenters were present, one to assist each subject. Each subject was seated in front of his respective reader and asked to direct his attention to the reader and the taped instructions (appendix A). The taped instructions began with a brief background and purpose of the experiment followed by a point-by-point description of the reader and a sample microfiche. After instruction in how to load the microfiche, find frame A-3 using the index, focus, and remove the microfiche, the experimenter demonstrated the procedure, and the subject was permitted to practice these steps

Practice No. 2

		A3 START GO TO B3	A4 END	A5 END	A6 END	
	B2 END	B3 GO TO B5	B4 END	B5 GO TO C3	B6 END	
B1 END	C2 END	C3 GO TO D2	C4 END	C5 END	C6 END	

until satisfied with his ability to perform the task. The subject then received instruction for the branching task and was asked to complete the two practice microfiche. Questions concerning the procedure were invited following completion of the practice microfiche. Following the answering of all questions, instructions were given for the completion of the 16 exercise microfiche. Again, the subject was invited to ask questions concerning the procedure to be followed.

Two types of time periods were recorded during the sixteen microfiche exercises--a Reload Cycle and a Branching Cycle. These were human reaction times, and in the case of the automatic reader, included machine cycle times. Timing of the first Reload Cycle began when the subject removed the practice microfiche from the carrier and ended after the first microfiche of the exercise was loaded, focused on frame A-3, and the subject said "START." Timing of the Reload Cycle was recorded by a graphic pen excursion activated by the experimenter keying a double-throw switch. Upon "START" the subject proceeded with the first Branching Cycle. At the end of each 10-instruction Branching Cycle the subject said "END" and the alphanumeric of the END frame (e.g., "END, D-7"). The next Reload Cycle was initiated without delay. The word "END" cued the experimenter to key the timer in the Reload Cycle direction. This process was continued until 16 Reload Cycles and Branching Cycles were completed. The sequence of the exercise microfiche with respect to frame-to-frame interval was 1248124812481248 for all subjects.

The experimenter manually recorded the alphanumeric END frame designators verbalized by the subject. An erroneous END frame was the criterion for a Branching Cycle error. Where a Branching Cycle error occurred, a mean time for that subject's correct Branching Cycles for like frame-to-frame intervals was entered in the data matrix.

SECTION III

RESULTS AND DISCUSSION

This experiment examined the performance of typical Navy recruits in the use of various off-the-shelf microfiche readers. The readers varied with respect to their loading/unloading and frame positioning features. In addition, the complexity of the simulated branching task was varied. The mean Reload Cycle times, Branching Cycle times, and positioning error rates for each of the five reader configurations are depicted in table 1.

TABLE 1. MEAN RESPONSE TIMES FOR RELOAD CYCLE AND BRANCHING CYCLE AND ERROR RATE

Reader Index Type	Mean Reload Cycle (Sec.)	Mean Branching Cycle (Sec.)	Errors/ Branching Cycle
Grid Map	24.17	52.21	.010
Automatic	18.41*	52.47*	.141
Dual Linear	28.15	69.81	.021
Projected Frame	32.29	91.34	.042
Linear/Dial	42.71	97.15	.052

* Includes machine cycle time

RELOADING TASK

The Reload Cycle time differences (figure 6) were analyzed by a two-way analysis of variance. The microfiche readers varied significantly ($F_{4,940} = 168.69$, $p<.0005$) in the degree of difficulty of retrieving and reloading microfiche. Although the automatic reader was clearly superior it should be noted that the Reload Cycle task was accomplished by depressing push buttons while the other readers required a manual reload operation. The linear/dial index reader was the most difficult to load due to the great care required to initially align the microfiche with the dial index. The remaining three reader configurations employed

similar microfiche carriers. Differences between these readers may be attributed to the differences in the time required to locate the initial frame (A-3) once the microfiche was loaded.

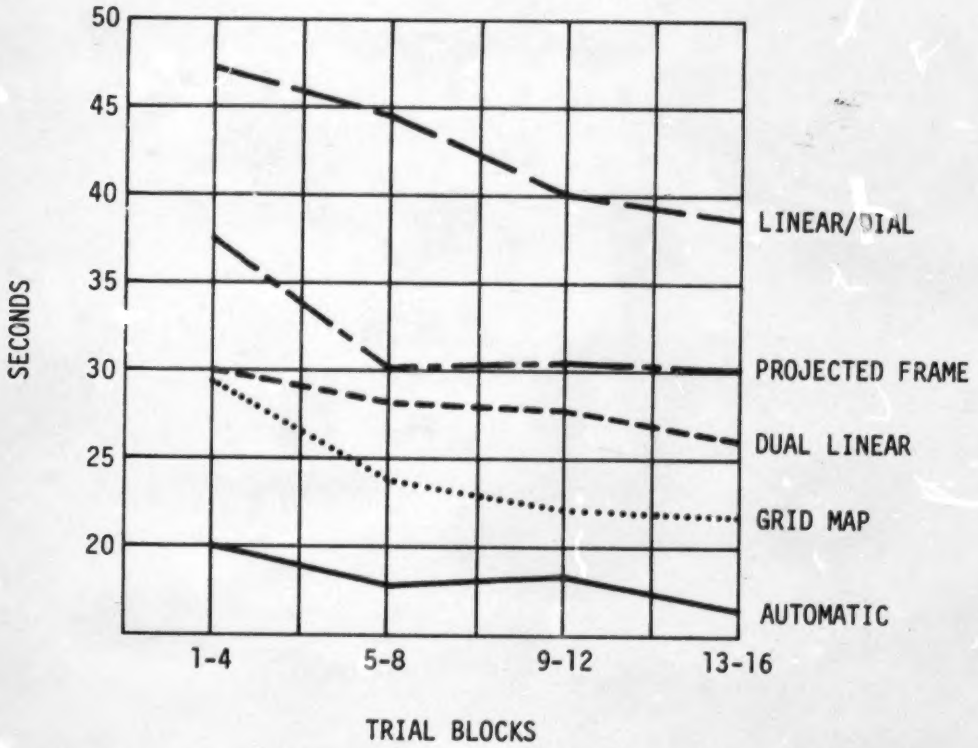

Figure 6. Mean Reload Cycle Times for Five Reader Types, By Trial Blocks

The effect of trial blocks upon performance shown in figure 6, ($F_{3,940} = 17.56$, $p<.0005$) indicates some learning took place. As subjects were instructed to concentrate on accuracy rather than on speed, it was not surprising that the learning effect accounted for little of the total variability (Est. $\omega^2 = .03$).[1] While it appears that learning may have occurred differentially across readers, the interaction (Readers X Trials) was not significant at the .05 level.

[1] Steeper learning curves were found in the pilot study where subjects were instructed to work as quickly and accurately as possible. These instructions produced an unacceptable error rate, however, due to the emphasis on speed.

BRANCHING TASK

The effect of readers, frame-to-frame intervals, and trial blocks on Branching Cycle time (figures 7 and 8) was examined by a three-way analysis of variance. Readers differed significantly ($F_{4,55} = 28.79$, $p<.01$) with respect to ease of the branching task. It is particularly noteworthy that the subjects performed as well using the grid map positioning reader as with the automatic push-button reader. Similarly, the near congruency of the curves for the linear/dial index and the projected frame designator types of readers, particularly at the higher frame-to-frame intervals, indicated little difference between these readers.

As the frame-to-frame interval increased, the branching task required significantly more time ($F_{3,165} = 537.98$, $p<.01$). This increased task complexity resulted in an interaction (Reader X Interval) with the most pronounced differences between readers occurring at the higher intervals.

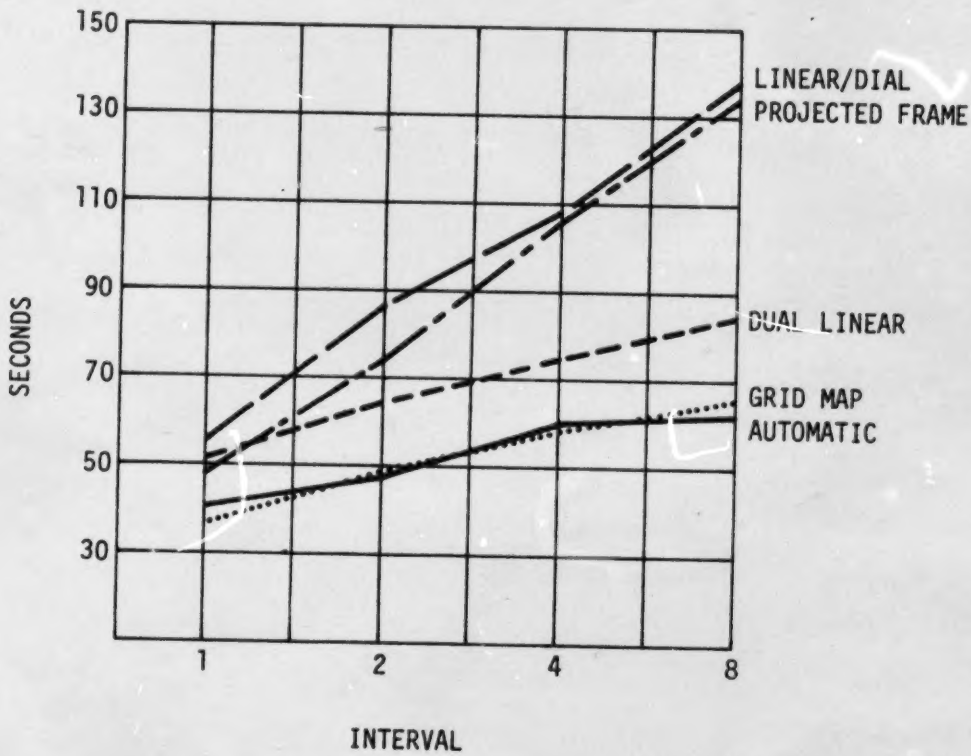

Figure 7. Mean Branching Cycle Times for Five Reader Types, By Frame-To-Frame Interval

The effect of trial blocks (figure 8) was significant ($F_{3,165}$ = 21.88, $p<.01$) indicating some learning resulted from practice; however, this factor accounted for little variability (Est. ω^2 = .01). The somewhat steeper learning curves for the linear/dial and projected frame designator readers resulted in an interaction (Reader X Trial Blocks) ($F_{12,165}$ = 2.83, $p<.01$). Although the effect due to trial blocks was moderated by the instructions to the subjects, the two most cumbersome frame positioning techniques showed the most improvement with practice. Apparently the use of these readers required more time for the subjects to develop consistent positioning techniques.

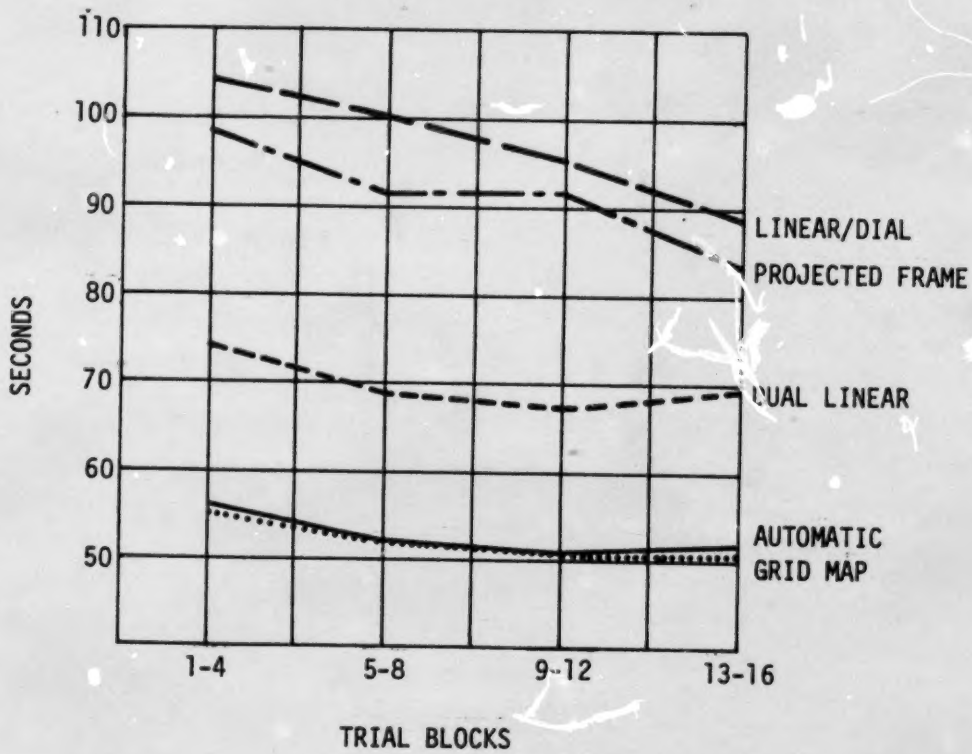

Figure 8. Mean Branching Cycle Times for Five Reader Types, By Trial Blocks

The rate of learning was differentially affected by the size of the frame-to-frame interval (figure 9) as evidenced by a significant ($F_{9,495}$ = 1.88, $p<.05$) interaction (Interval X Trial Blocks); however, this effect was very slight (Est. $\omega^2<.01$).

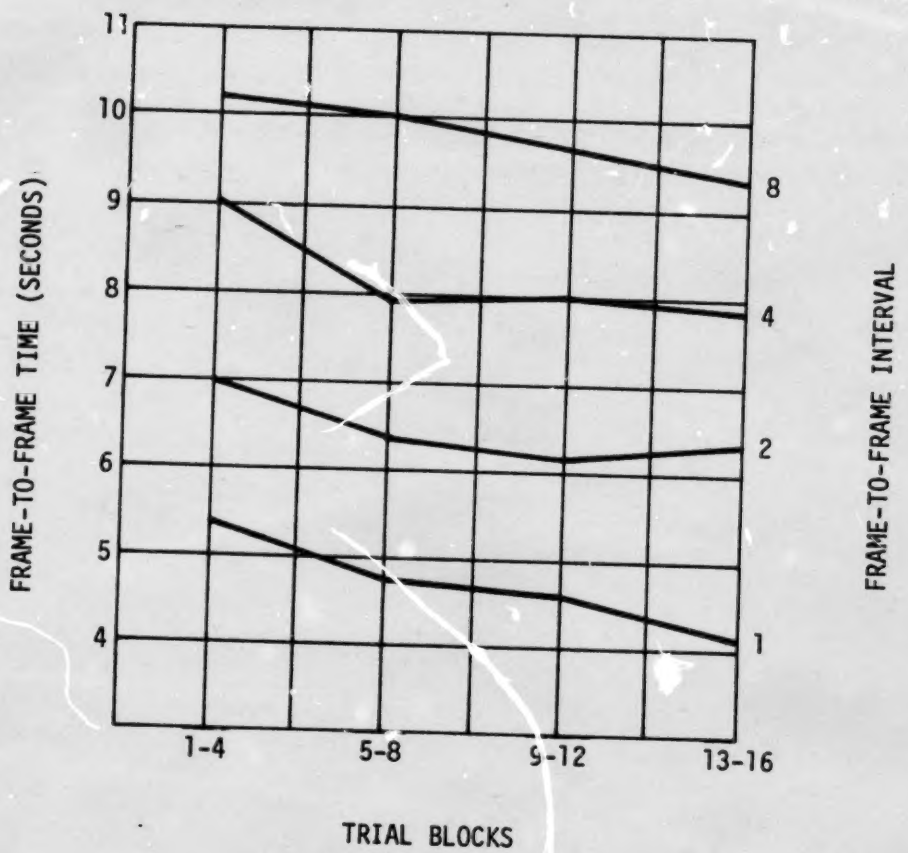

Figure 9. Mean Frame Positioning Time for Four Frame-to-Frame Intervals, By Trial Blocks

FRAME POSITIONING ERRORS

As shown in table 1, the error rate for the automatic push-button reader was significantly higher than that of the other readers (χ^2 = 36.52, $p<.001$, df = 1). Apparently some characteristic of the positioning servomechanism interferred with the subjects' short-term memory. While remembering the most recent instruction the subject was required to attend to a push-button array and depress either one or two buttons to access the appropriate frame. The corresponding reaction of the reader positioning mechanism was noisy and somewhat startling. In contrast, the task using the other readers involved manually searching for the appropriate column and row under comparatively silent conditions.

The error rate for the grid map reader was significantly lower (χ^2 = 4.22, $p<.05$, df = 1) than that of the linear/dial reader. The larger error rate for the linear/dial reader may also be attributable to some confounding of short-term memory due to the more complex indexing mechanism. None of the other error rate differences were significant.

The effects of frame-to-frame interval and trial blocks on error rate were not significant.

ADDITIONAL OBSERVATIONS

In the course of this study, other characteristics of the microfiche readers used became apparent. Although these features were not the subject of investigation they are worthy of note.

READER DESIGN CHARACTERISTICS. The Bruning 95 reader stored and transported the microfiche between plastic sleeves, which protected the film. Because of the automatic loading feature, the microfiche were never touched and thus remained free of dirt and fingerprints. Considerable scratching of the sleeves did occur, however, resulting in a detriment to the projected image. A newer model of the same machine was subsequently examined. In this model, the lens is lifted during positioning moves, apparently resolving the scratching problem. However, with this change the lens must be refocused more frequently.

All other reader types subjected the microfiche to handling, and the accumulation of dirt and fingerprints required periodic wiping of the film. The Realist/Vantage I and the WSI Mini-Cat 1114 readers carried the microfiche between two glass flats which also accumulated dirt and fingerprints, and required periodic wiping.

Both the Bruning 95 and the Realist/Vantage I readers permitted comfortable viewing from a variety of user postures. This is seen as a desirable feature as the user may change viewing positions during

prolonged use, thereby minimizing discomfort. This feature also facilitates performance of a concurrent task such as writing or troubleshooting equipment. The WSI Mini-Cat 1114 and the Kodak Ektalite 120 readers both require the user to maintain a more constant viewing position. Departure from this position results in a decrement or loss of the projected image.

ECONOMIC CONSIDERATIONS. The Kodak Ektalite 120, WSI Mini-Cat 1114, and Realist/Vantage I readers are of rather simple electro-mechanical design, with an initial cost of less than $200 per unit. Due to the design simplicity, routine maintenance normally consists of the periodic replacement of the projection lamp. The Bruning 95, on the other hand, has a current procurement cost of approximately $2500. The electro-mechanical design is quite complex, which would probably result in significantly greater maintenance costs than the other three readers. Such considerations make impractical any large-scale procurement of this reader for Navy training purposes. However, this reader may be suited for other uses, such as the storage and retrieval of parts catalogues or archival-type documents. Potential for use of this reader must be carefully evaluated within the context of its intended application.

USER ACCEPTANCE. Negative views regarding the microfiche medium are not uncommon. This is understandable as much of the materials on microfiche encountered within DoD are reproductions of hardcopy with varying degrees of legibility. Publications designed specifically for microfiche are rarely encountered. This shortcoming is compounded by the existence of a variety of readers which are either poorly designed or of outdated design. Finally, the acceptance of microfiche as a viable alternative to offset copy has been inhibited by the resistance-to-change resulting from years of human conditioning in the use of more traditional media.

The 60 subjects used in this study unanimously expressed interest in and initial acceptance of using microfiche readers. It is felt that this resulted from careful preparation of the stimulus materials, proper instruction in the use of the readers, and perhaps a certain absence of bias on the part of the youthful subjects. However, this study did not require prolonged use or extensive reading of textual materials. This topic will be examined in detail in phases II, III and IV of this project.

SECTION IV

CONCLUSIONS

The results of this study have implications for the future use of the microfiche medium in Navy training. It was demonstrated that a typical Navy recruit can, with a minimum of instruction, be trained to use a cross-section of available microfiche readers and perform the branching task inherent in programmed learning.

The reader indexing methods examined differed significantly on three dimensions--loading/unloading of microfiche, frame positioning (branching), and positioning error rate. These performance characteristics may be combined with other observations to form an overall assessment of the readers tested in determining their ease-of-use and suitability for Navy training purposes.

The Realist/Vantage I reader with the grid map indexing system was viewed as the most efficient of those tested. This reader is moderately priced, allows a comfortable user viewing posture, and is easy to operate as evidenced by superior performance in the branching task and unload/load task, combined with the lowest error rate.

The Bruning 95 reader offers the advantages of rapid loading/unloading of microfiche and rapid frame positioning; however, the frame positioning error rate was significantly higher than that of the other readers. In addition, the high cost of procurement and maintenance of this reader discourages its use for Navy training. The Kodak Ektalite 120 reader was cumbersome to load and position frames. This reader displays only a half-frame image and requires a constant user viewing posture. The WSI Mini-Cat 1114 reader had a relatively low error rate, but the ease of loading/unloading and frame positioning was significantly lower than that of the automatic or grid map readers.

One common technique for locating frames was found to be inefficient. Numerous users have reported that they almost never use the alphanumeric indexing system inherent in virtually all readers. It is apparently common practice to find microfiche frames by scanning the projected images for the appropriate frame. This technique was simulated in the experiment by the "projected frame designator" indexing method. It proved to be clearly inferior to the grid map indexing method using the same reader. This evidence supports the conclusion that materials prepared for microfiche should contain the alphanumeric designators vice page numbers, and that operators should be trained to use the corresponding alphanumeric indexing system of the reader employed.

The performance differences across the indexing methods examined have implications for the design and future procurement of readers to be

used for training. Differences among readers with respect to unload/load, branching, and error correction times, when extrapolated to encompass the total use of this medium for training, may result in significant, quantifiable dollar savings. Perhaps more importantly, the ease-of-use of a particular type of reader may affect the attitude of users, or potential users, toward acceptance of microfiche as a viable training medium.

The time required to execute a branching task was differentially affected by the frame-to-frame interval. This suggests that programmed text designed for microfiche should minimize the interval in branching requirements in the interest of time economy.

While some questions were answered by this study, continued investigation of the feasibility of this medium for training purposes is imperative. The research literature dealing with the effects of the medium on learning of cognitive skills indicates that the use of microforms may not be optimum in certain learning situations (Baldwin and Bailey, 1971; Grausnick and Kottenstette, 1971b). Before decisions may be made regarding use of microfiche for training, the medium must be evaluated in the applied setting for which it is being considered.

FOLLOW-ON STUDIES

Phase II of this project will study the effect of using microfiche as the training medium in a complete technical training course. The lesson materials for the Basic Electricity and Electronics (BE&E) School, Orlando, will be republished on microfiche. An experimental group of trainees using the microfiche materials will be compared to those trainees using paper lessons to determine the effects of the new medium, if any, on school performance.

Phase III of the project will be a replication of the first two phases using prototype hand-held, battery-operated microfiche readers being developed by the David W. Taylor Naval Ship Research and Development Center. The readers will be the initial output of the Personalized Portable Micromedia Display System (PPMDS) development effort. The performance of these innovative readers will be compared to the baseline data provided in phases I and II.

In phase IV, learning modules designed for the microfiche medium will be evaluated. These learning materials will use letter styles and sizes for optimum legibility on microfiche. Information will be generally organized according to learning theory algorithms found in Aagard and Braby (1976) and in the Interservice Procedures for Instructional System Development (NAVEDTRA 106A) of 1 August 1975. The formats of these learning materials require frequent branching and accessing reference information, operations easily accommodated with microfiche. The

development and evaluation of these modules is a part of the Navy Technical Information Presentation Program (NTIPP) and is funded, in part, by the David W. Taylor Naval Ship Research and Development Center. Continued field research, including cost-benefit analyses, should pave the way for the judicious use of microfiche technology in the education and training environment.

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Kottenstette, J. P. and Bailey, K. A. An Investigation of the Evironment for Educational Microform Utilization. Phase II. Student Use of Classroom Microform in Support of a Content Course. April 1971. Denver Research Institute. Denver University, Colorado.

NAVEDTRA 106A, Interservice Procedures for Instructional Systems Development. August 1975. Executive Summary and Model, Phases I through IV. Naval Publications and Forms Center, Philadelphia, PA 19120.

APPENDIX A

INSTRUCTIONS TO SUBJECTS

A common core of standardized, taped instructions (pages 26 to 27) was given to all subjects except those using the Bruning 95. These instructions were supplemented with specific operating instructions for the reader to which subjects were assigned (pages 28 to 31). The instruction varied slightly for the Bruning 95 due to the unique design of this reader (pages 32 to 33).

COMMON CORE INSTRUCTIONS

A decision has been made by the Navy to put certain instructional materials on microfiche film instead of the usual books and paper. The two major reasons for using microfiche are reduced cost and space. It is estimated that the Navy can save millions of dollars annually by going to microfiche. A single microfiche film can contain 98 pages of information, and a stack the size of a shoe box could contain 200,000 pages of information.

The instructor will now show you a microfiche, also called a fiche. This fiche is a photographic miniature of 96 printed pages. Each of the 96 pages on the fiche is called a frame. There are 14 columns of frames, numbered 1 through 14, left to right. There are seven rows of frames lettered A through G, top to bottom. Each frame has a letter and a number. For example, frame B-3 would be the second row down and the third column across.

In order to use the microfiche film a special microfiche reader, like the one in front of you, is required. The Navy is planning to buy several thousand portable microfiche readers so that one may be issued to each student in a class for his personal use. Several different features are available in the readers and the Navy is interested in knowing which features will be most useful for the microfiche user before buying additional microfiche readers.

To view the fiche the reader is used to magnify the fiche frames and project them on the viewing screen. The instructor will point out the main parts of the reader in front of you--the viewing screen, the lens, the fiche carrier, and the index.

You are to be part of an experiment to study microfiche loading, unloading, and frame positioning features. The time required for you to perform these tasks with this reader will be recorded and compared with the times of other Navy personnel using other microfiche readers, so that the different features and readers may be compared. The results of this experiment will have an effect on the type of microfiche reader the Navy buys so it is important that you perform the tasks as well as possible.

READER-SPECIFIC INSTRUCTIONS WERE GIVEN HERE

There are 96 exposed frames on each fiche. Each frame has a letter and number designator at the top and either the word "END" or some instructions, such as "Go to B-3," near the center of the frame. When the instructor tells you to begin, unload the fiche that is in the reader and load the practice fiche. Say the word "START" as you begin moving from A-3. The last instruction on the fiche will bring you to a frame marked "END." Say the word "END" and the frame letter and number of the END frame. For example, "END, C-11." Without delay, load the next practice fiche, find frame A-3, say "START" and begin following the instructions. When you reach the END frame say "END" and the frame letter and number. The instructor will answer any questions before you begin.

During the next part of the exercise you will complete the instructions on all of the fiche in front of you, without stopping until the last fiche is completed. When the instructor says "Begin," unload the fiche that is in the reader, load the first fiche of the exercise, find frame A-3, and begin following the instructions. Unload each fiche as it is completed, load the next fiche and proceed without delay until all the fiche are completed. Don't forget to say "START" as you begin on frame A-3 of each fiche. Work quickly and accurately; however, accuracy is more important than speed. The instructor will answer any questions before you begin.

READER-SPECIFIC INSTRUCTIONS

REALIST/VANTAGE I (With Index)

To load the fiche into the reader, pull the carrier toward you until the upper glass opens and the carrier stops. The glass plates will remain open for fiche loading. Hold the fiche in front of you so that the title may be read. Insert the fiche face down between the glass plates with the white strip closest to you. Place the fiche all the way to the back right-hand side of the carrier. Push the carrier in to close the upper glass.

The index card below and to the left of the carrier contains 98 frames which correspond to the fiche frames. To find a designated fiche frame, move the reference pointer attached to the carrier to the desired frame on the index card. This will approximately center the desired fiche frame. Using the index pointer, find frame A-3.

A sharp clear image is achieved by applying a slight downward pressure while turning the lens focus ring. The reader may require refocusing periodically. Take time, now, to practice loading, unloading, and focusing the first practice fiche.

READER-SPECIFIC INSTRUCTIONS

REALIST/VANTAGE I (Without Index)

To load the fiche into reader, pull the carrier toward you until the upper glass opens and the carrier stops. The glass plates will remain open for fiche loading. Hold the fiche in front of you so the title may be read. Insert the fiche face-down between the glass plates with the white strip closest to you. Place the fiche all the way to the back right-hand side of the carrier. Push the carrier in to close the upper glass.

Frame A-3 is the first exposed frame and is located in the upper left-hand corner of the fiche. When the fiche is loaded in the carrier, frame A-3 will be the frame closest to you on the left-hand side. Locate frame A-3 by moving this frame under the lens using the lens index guide as a reference. The instructor will demonstrate. In locating other frames, move the carrier left or right to find the frame number, and in or out to find the frame letter.

A sharp clear image is achieved by applying a slight downward pressure while turning the lens focus ring. The reader may require refocusing periodically. Take time, now, to practice loading, unloading, and focusing the first practice fiche.

READER-SPECIFIC INSTRUCTIONS

KODAK EKTALITE 120

To load the fiche into the reader turn the index dial until the letter "S" is just visible in the right side of the index window. Insert the fiche into the carrier from the left until a slight resistance is felt. Turn the index dial counter-clockwise and the fiche will begin to move into the reader. Turn the dial until the number 3 is visible in the window. Pull the dial toward you until the letter A is visible below the index arrow at the right front of the reader. Frame A-3 should now be approximately centered in the viewing screen. To find a designated fiche frame, turn the index dial until the appropriate frame number appears in the window and pull (or push) the index dial until the appropriate frame letter appears below the index arrow.

A sharp clear image is achieved by moving the focus lever on the right front of the reader either up or down. The reader may require refocusing periodically. To unload the fiche turn the index dial in either direction until the fiche is completely out of the reader. Take time now, to practice loading, unloading, and focusing the first practice fiche.

READER-SPECIFIC INSTRUCTIONS

WSI MINI-CAT 1114

To load the fiche into the reader pull the carrier toward you until the upper glass opens and the carrier stops. The glass plates will remain open for fiche loading. Insert the fiche face up between the glass plates, with the white strip closest to you. Place the fiche all the way to the back right-hand side of the carrier. Push the carrier in to close the upper glass.

The fiche frame number index is located on the left-hand side of the reader, below the carrier. The fiche frame letter index is located along the left-hand side of the carrier. To find a designated fiche frame, match the appropriate frame number and letter. For example, to find frame A-3, slide the carrier until the letter A is next to the number 3. This will approximately center frame A-3.

A sharp clear image is achieved by applying a slight downward pressure while turning the lens focus ring. The reader may require refocusing periodically. Take time, now, to practice loading, unloading, and focusing the first practice fiche.

TAEG Report No. 35

READER-SPECIFIC INSTRUCTIONS

BRUNING 95

A decision has been made by the Navy to put certain instructional materials on microfiche film instead of the usual books and paper. The two major reasons for using microfiche are reduced cost and space. It is estimated that the Navy can save millions of dollars annually by going to microfiche. A single microfiche film can contain 98 pages of information, and a stack the size of a shoe box could contain 200,000 pages of information.

The instructor will now show you a microfiche, also called a fiche. This fiche is a photographic miniature of 96 printed pages. Each of the 96 pages on the fiche is called a frame. There are 14 columns of frames, numbered 1 through 14, left to right. There are seven rows of frames lettered A through G, top to bottom. Each frame has a letter and a number. For example, frame B-3 would be the second row down and the third column across.

In order to use the microfiche film a special microfiche reader, like the one in front of you, is required. The Navy is planning to buy several thousand portable microfiche readers so that one may be issued to each student in a class for his personal use. Several different features are available in the readers and the Navy is interested in knowing which features will be most useful for the microfiche user before buying additional microfiche readers.

To view the fiche the reader is used to magnify the fiche frames and project them onto the viewing screen. The instructor will point out the main parts of the reader in front of you--the viewing screen, the fiche selector, the frame index, the focus wheel, and the fiche magazine. Notice that in using this reader, the fiche have been pre-loaded into the fiche magazine.

You are to be part of an experiment to study microfiche loading, unloading, and frame positioning features. The time required for you to perform these tasks with this reader will be recorded and compared with the times of other Navy personnel using other microfiche readers, so that the different features and readers may be compared. The results of this experiment will have an effect on the type of microfiche reader the Navy buys so it is important that you perform the tasks as well as possible.

To select the first practice fiche, press the button marked "1" of the fiche selector. Frame G-14 of the first fiche will appear on the viewing screen. Find frame A-3 by pushing the buttons marked "A" and "3" of the frame index. You may push these buttons one-at-a-time, or

simultaneously.

A sharp clear image is achieved by adjusting the white focus wheel on the right front of the reader. The reader may require refocusing periodically. Take time, now, to practice locating and focusing frame A-3 on practice fiche 1 and 2.

There are 96 exposed frames on each fiche. Each frame has a letter and number designator at the top, and either the word "END" or some instructions, such as "GO TO B-3," near the center of the frame. When the instructor tells you to begin, locate the first practice fiche, find frame A-3, focus, and begin following the instructions on the fiche. Say the word "START" as you begin moving from frame A-3. The last instruction on the fiche will bring you to a frame marked "END." Say the word "END" and the frame letter and number of the END frame. For example, "END, C-11." Without delay, locate the second practice fiche (fiche number 2), find frame A-3, say "START," and begin following the instructions. When you reach the END frame, say "END" and the frame letter and number. The instructor will answer any questions before you begin.

During the next part of the exercise you will complete the instructions on fiche 3 through 18, without stopping until the last fiche is completed. When the instructor says "Begin," locate fiche number 3, find frame A-3, and begin following the instructions. Continue on through fiche 4, 5, 6, and so on, until you have completed number 18. Don't forget to say "START" as you begin on frame A-3 of each fiche and "END" and the frame letter and number at the completion of each fiche. Work quickly and accurately; however, accuracy is more important than speed. The instructor will answer any questions before you begin.